

WHAT IS CLAIMED AS NEW AND DESIRED TO BE SECURED BY LETTERS  
PATENT OF THE UNITED STATES IS:

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105 n 106?  
1. An image recording method comprising:  
applying a pretreatment liquid on a surface of a recording  
5 material; and

discharging a recording ink according to image signals  
to form an ink image on the pretreatment liquid on the surface  
of the recording material before the pretreatment liquid  
applied on the recording material has dried, wherein the  
10 recording ink comprises a solvent and a component dispersed or  
dissolved in the solvent,

wherein the pretreatment liquid comprises a compound  
depressing at least one of the dispersibility and solubility  
of the component in the recording ink in an amount of 10 to 80 %  
15 by weight based on total weight, and

wherein the pretreatment liquid has a viscosity of from  
10 to 10,000 mPa · s at 25 °C.

2. The image recording method according to Claim 1,  
20 wherein the component in the recording ink is a colorant.

3. The image recording method according to Claim 1,  
wherein the pretreatment liquid has a viscosity of from 20 to  
10,000 mPa · s at 25 °C.

25 4. The image recording method according to Claim 1,  
wherein the pretreatment liquid is applied on the surface of

the recording material in an amount of from 0.5 g/m<sup>2</sup> to 10 g/m<sup>2</sup>.

5 5. The image recording method according to Claim 1,  
wherein the recording ink has a contact angle not greater than  
90° against the surface of the recording material on which the  
pretreatment liquid is applied.

10 6. The image recording method according to Claim 1,  
wherein the pretreatment liquid has a surface tension of from  
40 mN/m to 60 mN/m and the recording ink has a surface tension  
of from 20 mN/m to 40 mN/m.

15 7. The image recording method according to Claim 1,  
wherein the pretreatment liquid is applied on areas of the  
recording material on which the ink image is and is not formed.

20 8. The image recording method according to Claim 1,  
wherein the pretreatment liquid application is performed with  
a contact applicator.

9. The image recording method according to Claim 8,  
wherein the contact applicator comprises a roller.

25 10. The image recording method according to Claim 1,  
further comprising:

heating the ink image formed on the pretreatment liquid  
on the recording material before the pretreatment liquid dries.

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11. The image recording method according to Claim 1,  
wherein the recording material comprises pulp fibers, and  
5 wherein the recording material has a sizing degree not less than  
10 s and an air permeability of from 5 s to 50 s.

12. The image recording method according to Claim 1,  
wherein the component in the recording ink is an anionic  
10 material.

13. The image recording method according to Claim 12,  
wherein the anionic material is selected from the group  
consisting of anionic dyes, pigments dispersed by an anionic  
15 dispersant, dyes dispersed by an anionic dispersant, pigments  
modified by an anionic group, and anionic color particles.

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see claims 2 & 26  
14. A pretreatment liquid, comprising a compound in an  
amount of 10 to 80 % by weight based on total weight that  
20 depresses at least one of the dispersibility and solubility of  
a component in a recording ink, wherein the pretreatment liquid  
has a viscosity of from 10 to 10,000 mPa · s at 25 °C.

15. The pretreatment liquid according to Claim 14, wherein  
25 the component in the recording ink is a colorant.

16. The pretreatment liquid according to Claim 14, wherein

the viscosity of the pretreatment liquid is from 20 to 10,000 mPa · s at 25 °C.

17. The pretreatment liquid according to Claim 14, further  
5 comprising water in an amount of from 5 % to 80 % by weight based on total weight of the pretreatment liquid.

18. The pretreatment liquid according to Claim 14, further  
10 comprising water and a water-soluble liquid compound, wherein water and the water-soluble liquid compound are included in an amount of from 20 % to 80 % by weight based on total weight of the pretreatment liquid.

19. The pretreatment liquid according to Claim 18, wherein  
15 water is included in the pretreatment liquid in an amount not greater than 40 % by weight based on total weight of the pretreatment liquid.

20. The pretreatment liquid according to Claim 19, wherein  
20 the content of water is not greater than an equilibrium water content of the water-soluble liquid compound at 60 %RH.

21. The pretreatment liquid according to Claim 14, further  
comprising a water-soluble organic solvent in an amount of from  
25 5 to 70 % by weight based on total weight of the pretreatment liquid.

22. The pretreatment liquid according to Claim 14, wherein the compound depressing at least one of the dispersibility and solubility of the component in the recording ink is an ionic compound.

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23. The pretreatment liquid according to Claim 22, wherein the ionic compound is an ionic compound having an alkyl group having not less than 6 carbon atoms.

10 24. The pretreatment liquid according to Claim 22, wherein the ionic compound is an ionic polymer.

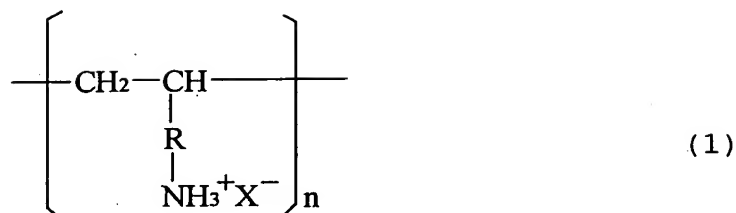
15 25. The pretreatment liquid according to Claim 22, wherein the ionic compound is a cationic compound. *See also claim 31*

26. The pretreatment liquid according to Claim 25, wherein the cationic compound is a cationic polymer.

20 27. The pretreatment liquid according to Claim 26, wherein the cationic polymer has a cationic degree not less than 3.0 meq/g.

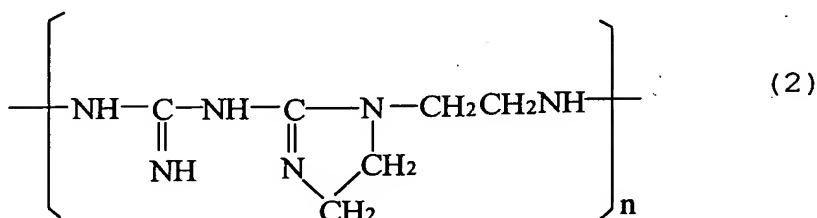
25 28. The pretreatment liquid according to Claim 26, wherein the cationic polymer has or includes a formula selected from the group consisting of the following formulae (1) to (18):

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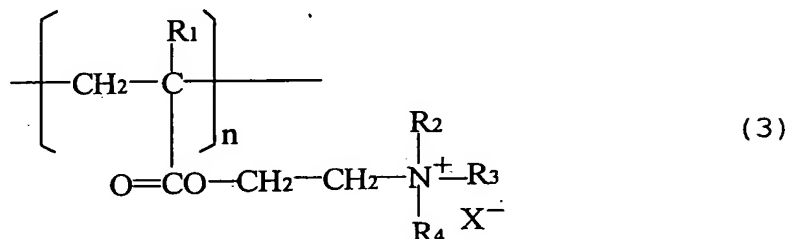
wherein  $\text{X}^-$  represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; R represents an alkylene group having from 1 to 3 carbon atoms; and n is an integer;

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wherein n is an integer;

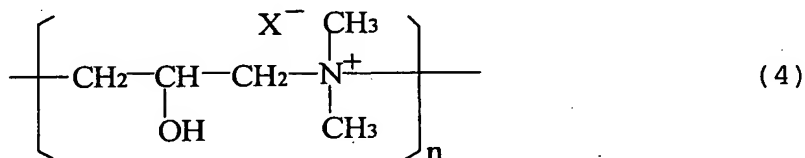
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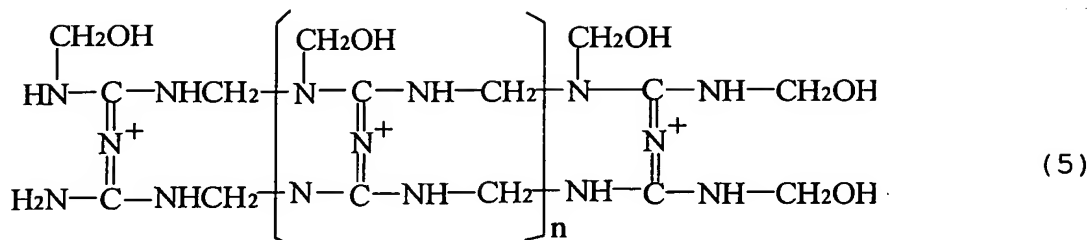
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wherein  $\text{X}^-$  represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion;  $\text{R}_1$  represents a hydrogen atom or a methyl group;  $\text{R}_2$ ,  $\text{R}_3$  and  $\text{R}_4$  independently represent a hydrogen atom or an alkyl group; and n is an integer;

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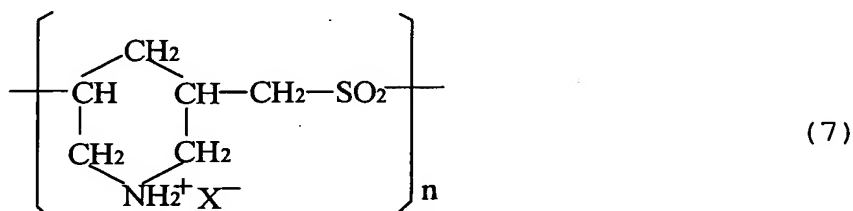
wherein  $\text{X}^-$  represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;



wherein n is an integer of from 5 to 30;



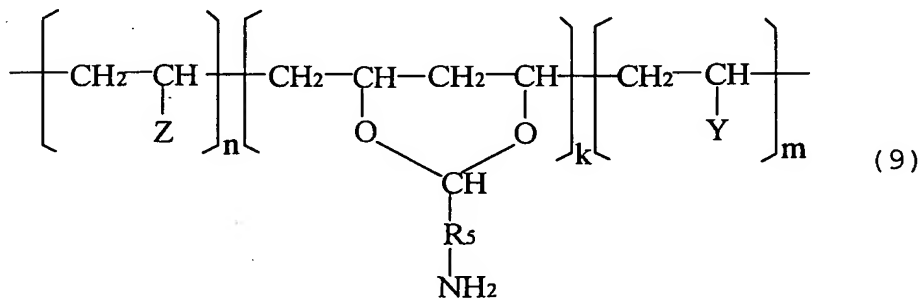
wherein n is an integer;



wherein  $\text{X}^-$  represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;

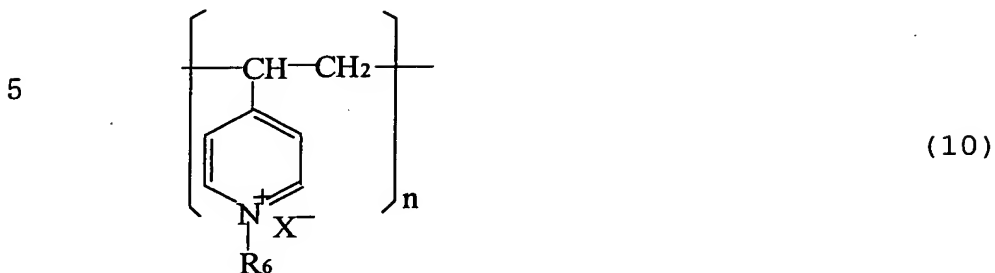


wherein n is an integer;

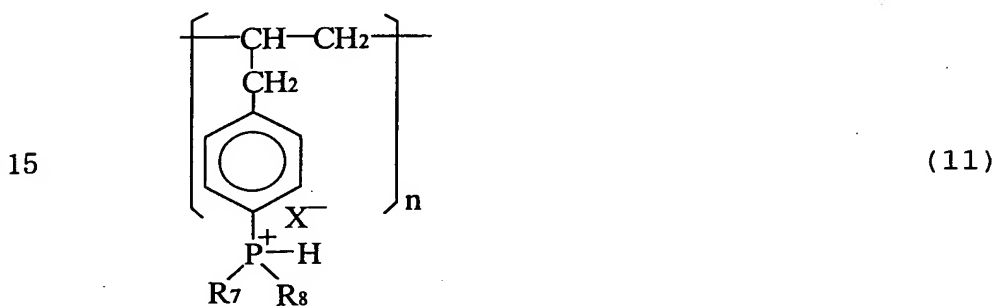


wherein Z and Y independently represent  $-\text{OCOCH}_3$  or  $-\text{OH}$ ;  $\text{R}_5$

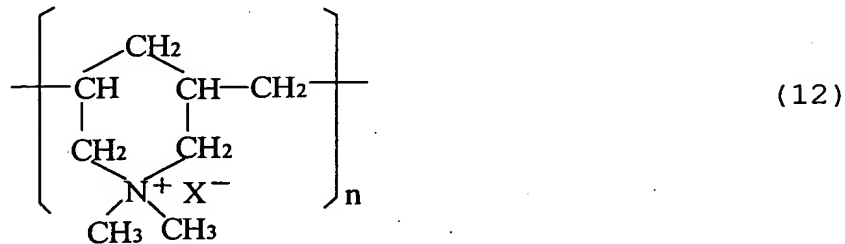
represents an alkylene group having from 1 to 4 carbon atoms;  
and n, k and m independently are integers;



wherein R<sub>6</sub> represents an alkyl group; X<sup>-</sup> represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;



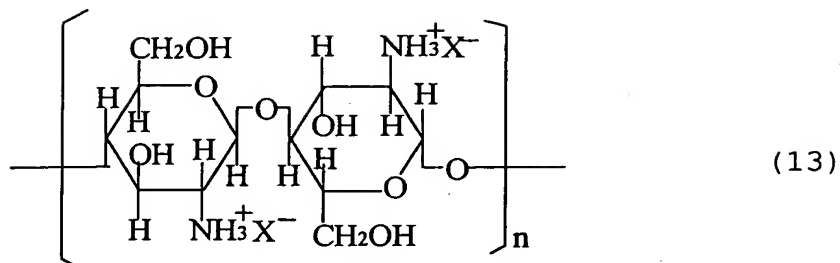
wherein R<sub>7</sub> and R<sub>8</sub> independently represent a hydrogen atom or an alkyl group; X<sup>-</sup> represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;



wherein X<sup>-</sup> represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer;

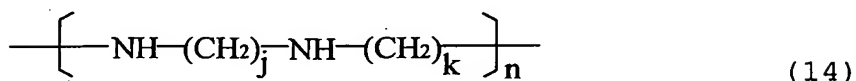


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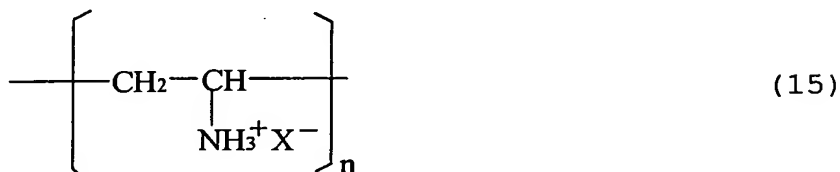
wherein  $\text{X}^-$  represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and  $n$  is an integer;

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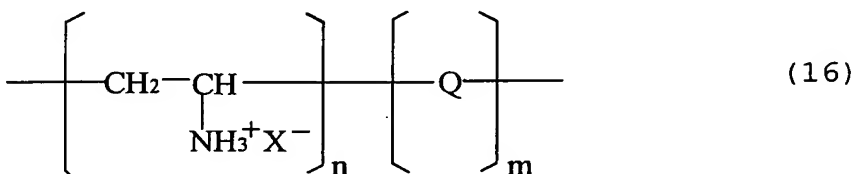
wherein  $j$  and  $k$  are independently an integer of from 2 to 6; and  $n$  is an integer;

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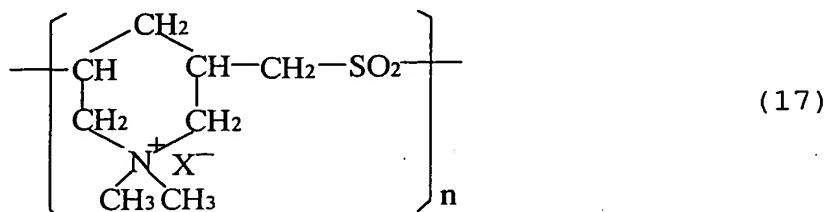
wherein  $\text{X}^-$  represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and  $n$  is an integer;

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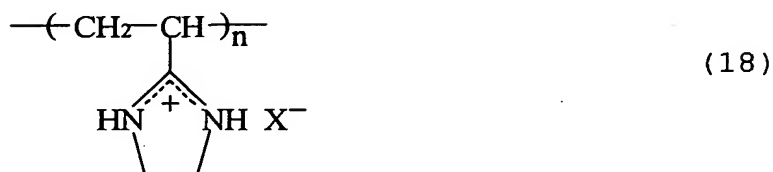


wherein  $\text{X}^-$  represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion;  $\text{Q}$  represents another repeating unit; and  $n$  and  $m$  are independently an integer;

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wherein  $X^-$  represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer; and



wherein  $X^-$  represents a halogen ion, a nitrate ion, a nitrite ion or an acetate ion; and n is an integer.

29. The pretreatment liquid according to Claim 26, wherein the cationic polymer is a cationic polymer comprising at least one of repeating units having the following formulae (19) and (20):



wherein  $D_1$  represents a substituent having one of the following formulae (21) and (22);  $D_2$  represents a hydrogen atom or a substituent having one of the following formulae (21) and (22); n and m are independently an integer,



wherein  $R_9$  and  $R_{10}$  independently represent a hydrogen atom, an alkyl group having from 1 to 12 carbon atoms or an allyl group;

R<sub>11</sub> and R<sub>12</sub> independently represent a hydrogen atom, an alkali metal or a substituent having the following formula (23):



wherein R<sub>13</sub> to R<sub>16</sub> independently represent a hydrogen atom, an alkyl group, an allyl group, a hydroxyalkyl group or a benzyl group.

30. The pretreatment liquid according to Claim 25, wherein the cationic compound is dispersed in the pretreatment liquid.

31. The pretreatment liquid according to Claim 30, wherein the cationic compound is a cationic silica.

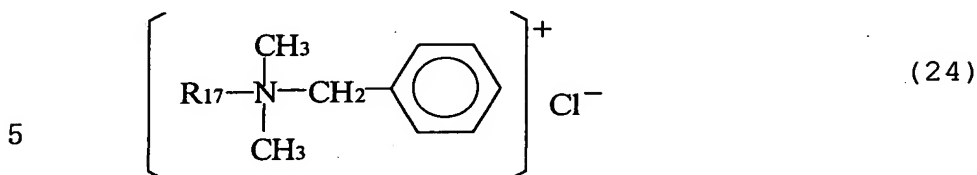
32. The pretreatment liquid according to Claim 30, wherein the cationic compound is emulsified in the pretreatment liquid.

33. The pretreatment liquid according to Claim 14, wherein the compound that depresses at least one of the dispersibility and solubility of the component in the recording ink is a water-soluble polyvalent metal salt.

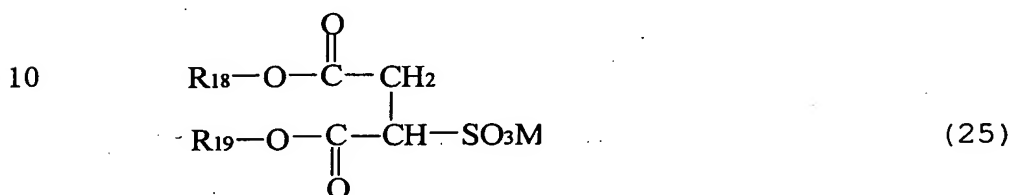
34. The pretreatment liquid according to Claim 14, further comprising at least one of a surfactant and a wetting accelerator, wherein the pretreatment liquid has a surface tension not greater than 40 mN/m.

35. The pretreatment liquid according to Claim 34, wherein

the surfactant has a formula selected from the group consisting of the following formulae (24) to (29):



wherein R<sub>17</sub> represents a lauryl group, a stearyl group or a myristyl group;



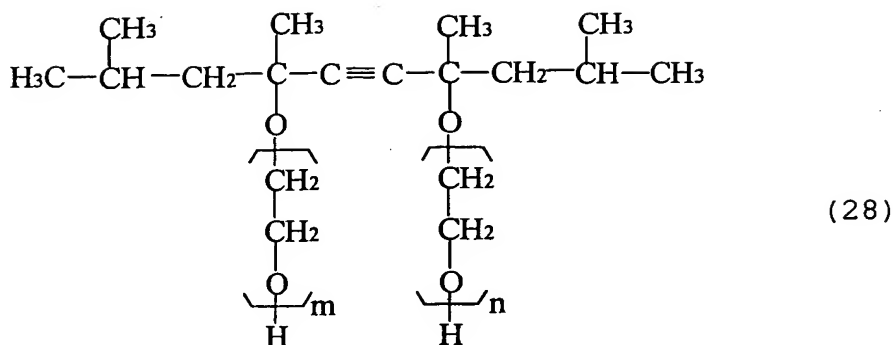
15 wherein R<sub>18</sub> and R<sub>19</sub> independently represent an alkyl group having not less than 3 carbon atoms which may be branched; M represents an alkali metal, an ammonium group, an alkanol amine group, a quaternary ammonium group or a quaternary phosphonium group;



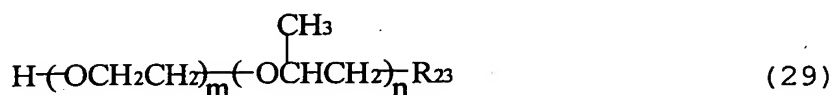
20 wherein R<sub>20</sub> and R<sub>21</sub> independently represent an alkyl group having from 5 to 7 carbon atoms; and m is an integer of from 5 to 20;



25 wherein R<sub>22</sub> represents a carbon chain having from 6 to 14 carbon atoms which may be branched; and n is an integer of from 5 to 20;



wherein m and n are independently 0 or an integer of from 1 to 20; and



wherein R<sub>23</sub> represents a carbon chain having from 6 to 14 carbon atoms which may be branched; and m and n are independently 0 or an integer of from 1 to 20.

36. The pretreatment liquid according to Claim 34, including a surfactant, wherein the surfactant is included in the pretreatment liquid in an amount of from 0.1 to 10 % by weight.

37. The pretreatment liquid according to Claim 14, further comprises at least one of an antiseptic agent or antimildew agent in an amount of from 0.1 to 5 % by weight based on total weight of the pretreatment liquid.

38. An image recording method comprising:  
 discharging a recording ink according to image signals to form an ink image on a surface of the recording material on

which a pretreatment liquid is applied and has dried, wherein the recording ink comprises a solvent and a component dispersed or dissolved in the solvent,

wherein the pretreatment liquid comprises a compound  
5 depressing at least one of the dispersibility and solubility of the component in the recording ink in an amount of 10 to 80 % by weight based on total weight, and

wherein the pretreatment liquid has a viscosity of from 10 to 10,000 mPa · s at 25 °C.

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(39) A recording material having on a surface thereof a dried pretreatment liquid, wherein the pretreatment liquid comprises a compound depressing at least one of the dispersibility and solubility of the component in the recording  
15 ink in an amount of 10 to 80 % by weight based on total weight, and wherein the pretreatment liquid has a viscosity of from 10 to 10,000 mPa · s at 25 °C.